

# Introduction to Conference on Human Health Effects of New Approaches to Insect Pest Control

by Hans L. Falk\*

Before the conference began I was asked about our motivation: What did we know already? What has gone wrong? What health hazards have resulted from the newer ways of controlling pests?

I could say that we are only trying to be ahead of developments that we want to hear about potential health hazards if they exist. We know of none and expect none, but would just like to be informed. We want to confirm that our knowledge is up to date, that health effects have been reviewed from all angles, and that any health hazards uncovered can be acted on now. As far as I am aware we are not sitting on a problem and need not squirm. Instead, I hope only to be a little more educated on the impact of these new pest control methods when I leave this conference.

I also explained that some of the pest control techniques referred to as "new" are only relatively new because they have been taken off the shelf where they were put when DDT entered upon the scene. Some of these research approaches were developed some time ago, and such techniques are well established in the laboratory. They may not have been tried extensively in the field but are not new. Some of the chemicals, on the other hand, are new, and I am anxious to learn more about them.

With regard to the chemical groups involved, we will discuss some that are of interest because their chemical structures may have certain implications regarding health effects. For some of these chemicals, particularly the sex attractants, the quantity reaching the environment may be very small. This does not present a problem to the insects involved, who can detect them and take appropriate action. It may be a problem, however, for us to test them

for adverse health effects on mammalian species. The quantities necessary for the tests will be fantastically high compared to the quantity in the environment needed to have an effect on the insects, and after completion of the test we will have the problem of extrapolation from the experimental exposure to that encountered in real life. In some situations, a level of only a few thousand molecules in the air is needed to attract insects. I can see great extrapolators worrying about marked physiological action by an effective dose of only a few thousand molecules, a level that would not be readily detected by the very best analytical monitoring techniques. I am looking forward to a discussion on how to monitor and assess toxic environmental levels of such compounds.

The type of chemicals we are going to deal with are not all-inclusive. One should not get the impression that this is all there is to the new methods. We picked some, but may have forgotten others. The justification for selecting them for review is that they are related to compounds that may be potent enzyme inducers or inhibitors, alkylating agents, or effective pharmaceuticals. We are not always sure that the chemical will be involved in future pest control programs. Indeed, we may have selected a few that nobody will ever hear of again.

One group of interesting compounds that we might not hear about is that of sex repressants for some species. They can be synthesized readily, and since the molecules are comparatively simple, chemists have synthesized many analogs. A slight change in the molecule might result in a large change in effect. Some precursors of sex attractants which may be potent inhibitors of sex attraction have not as yet been exploited. Sex attractants are specific for each species. Generally they attract the male to the female, but in some species it is the

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female that is attracted. What is also of interest and may lend itself to some unusual exploitation is that in some cases it is the host that advertises. It is the tree in which the eggs are supposed to be laid that produces the attractant for male and female so that the next generation can feed on it right away. It is a new kind of advertising invented by nature.

There are many different chemical structures that act as attractants for different species, and insects are so specific that they will only go after a particular one. The task of cataloging all these chemicals is quite large.

When we discuss juvenile hormones we may encounter chemical structures that also could possess toxicological properties, but no evidence is available at this time. We will, however, list and discuss the different chemicals capable of acting as juvenile hormones, and explore their properties.

One topic which needs to be discussed among all the newer pest control methodologies is natural pest control. We can discuss the microorganisms that can control some species, but there is a tremendous literature on the control of individual species.

This is a fascinating subject because nature has really been at it for millions of years and has done some very unbelievable things. Now we can find out how some of the insects are controlled by their predators or their own pathogens, and how we can actually utilize that system. In general, for many of these pest control microbes, we do not see any problem that this may create. There may be technical difficulties sometimes in getting the predator together with the pest at the right time, because the more successful the predator is in eliminating the pest, the sooner he may run out of food and the poor predator may not have a chance to survive. This has produced the need to also breed pests in the laboratory so that under some conditions we can supply pests again and keep the predators going.

Altogether I think it may be very educational for most of us to cover this whole field of specificities of insects and their controls that are in existence, whether we know them or not; then we can see what we can do in some cases to control specific pests.